

providing a plasma processing chamber having a single chamber, substantially azimuthally symmetric configuration within which a plasma is both ignited and sustained during said processing of said substrate, said plasma processing chamber having no separate plasma generation chamber;

providing a coupling window disposed at an upper end of said plasma processing chamber;

providing an RF antenna arrangement disposed above a plane defined by said substrate when said substrate is disposed within said plasma processing chamber for said processing;

providing an electromagnet arrangement disposed above said plane defined by said substrate, said electromagnet arrangement being configured so as to result in a radial variation in the controlled magnetic field within said plasma processing chamber in the region proximate said coupling window and antenna when at least one direct current is supplied to said electromagnet arrangement, said radial variation being effective to affect processing uniformity across said substrate;

providing a dc power supply coupled to said electromagnet arrangement;

placing said substrate into said plasma processing chamber;

flowing reactant gases into said plasma processing chamber, said reactant gases include a combination of gases, wherein two or more gases of said combination of gases included in said reactant gases is a $C_x F_y H_z O_w$ gas;

striking said plasma out of said reactant gases; and

changing said radial variation in said controlled magnetic field within said plasma processing chamber in said region proximate to said antenna to improve said processing uniformity across said substrate.

32. The method of claim 31 wherein the reactant gases further include one or more gases selected from a group of gases consisting of O_2 , N_2 , CO , CO_2 , SF_6 , NF_3 , NH_3 , Cl_2 and HBr .

33. (Once Amended) The method of claim 32 herein the reactant gases further include one or more gases selected from a group of gases consisting of He, Ne, Ar, Kr and Xe.

34. (Once Amended) The method of claim 31 wherein the reactant gases further include one or more gases selected from a group of gases consisting of He, Ne, Ar, Kr and Xe.

35. (Once Amended) The method of claim 31 wherein the reactant gases include a gas that is selected from a group of gases consisting of C₅F₈, C₄F₈, C₄F₆, C₃F₆, C₂F₆ and CF₄.

36. (Once Amended) The method of claim 31 wherein the reactant gases include a gas that is selected from a group of gases consisting of C₂HF₈, C₂HF₅, CHF₃, C₂H₂F₂, C₂H₂F₄ and CH₂F₂.

37. (Once Amended) The method of claim 31 wherein the reactant gases include a gas that is selected from a group of gases consisting of:

C₅F₈ +CF₄+CHF₃+CH₂F₂;

C₄F₈ +CF₄+CHF₃+CH₂F₂;

C₄F₆ +CF₄+CHF₃+CH₂F₂;

C₃F₆ +CF₄+CHF₃+CH₂F₂;

C₂F₆ +CF₄+CHF₃+CH₂F₂;

C₂HF₅ +CF₄+CHF₃+CH₂F₂;

C₅F₈ +CF₄+CHF₃+C₂H₂F₄;

C₄F₈ +CF₄+CHF₃+C₂H₂F₄;

C₄F₆ +CF₄+CHF₃+C₂H₂F₄;

C₃F₆ +CF₄+CHF₃+C₂H₂F₄;

Reactant

$\text{C}_2\text{F}_6 + \text{CF}_4 + \text{CHF}_3 + \text{C}_2\text{H}_2\text{F}_4;$
 $\text{C}_2\text{HF}_5 + \text{CF}_4 + \text{CHF}_3 + \text{C}_2\text{H}_2\text{F}_4;$
 $\text{C}_5\text{F}_8 + \text{CHF}_3 + \text{C}_2\text{HF}_5 + \text{CH}_2\text{F}_2;$
 $\text{C}_4\text{F}_8 + \text{CHF}_3 + \text{C}_2\text{HF}_5 + \text{CH}_2\text{F}_2;$
 $\text{C}_4\text{F}_6 + \text{CHF}_3 + \text{C}_2\text{HF}_5 + \text{CH}_2\text{F}_2;$
 $\text{C}_3\text{F}_6 + \text{CHF}_3 + \text{C}_2\text{HF}_5 + \text{CH}_2\text{F}_2;$
 $\text{C}_2\text{F}_6 + \text{CHF}_3 + \text{C}_2\text{HF}_5 + \text{CH}_2\text{F}_2;$ and
 $\text{CF}_4 + \text{CHF}_3 + \text{C}_2\text{HF}_5 + \text{CH}_2\text{F}_2.$

38. The method of claim 37 wherein the reactant gases further include one or more gases selected from a group of gases consisting of O_2 , N_2 , CO, CO_2 and SF_6 .
39. The method of claim 38, wherein the reactant gases further include one or more gases selected from a group of gases consisting of He, Ne, Ar, Kr and Xe.
40. The method of claim 37, wherein the reactant gases further include one or more gases selected from a group of gases consisting of O_2 , N_2 , CO, CO_2 , NF_3 , NH_3 , Cl_2 or HBr and SF_6 .
41. The method of claim 37, wherein the reactant gases further include one or more gases selected from a group of gases consisting of He, Ne, Ar, Kr and Xe.
42. The method of claim 31 wherein said plasma processing chamber includes an inner surface and at least the inner surface of the plasma processing chamber is made of a material that does not substantially interact with reactive gas chemistries that are flown into said plasma processing chamber.

All end

43. The plasma processing system of claim 42 wherein said material of said plasma processing chamber is selected from a group of materials consisting of silicon carbide, quartz, silicon, silicon dioxide, carbon, boron carbide, and boron nitride

44. The method of claim 31, wherein said plasma processing chamber includes silicon carbide.

45. The method of claim 31 wherein said plasma processing chamber is made entirely of silicon carbide.
